

REMARKS

Entry of the foregoing, reexamination and reconsideration of the subject application are respectfully requested in light of the amendments above and the comments which follow.

As correctly noted in the Office Action Summary, claims 1-14 were pending. By the present response, claims 1, 11 and 12 have been amended. Thus, upon entry of the present response, claims 1-14 remain pending and await further consideration on the merits.

Support for the foregoing amendments can be found, for example, in at least the following locations in the original disclosure: page 4, lines 26-29; and the original claims.

Entry of the foregoing is appropriate pursuant to 37 C.F.R. §1.116 for at least the following reasons: the amendments raise no new issues that would necessitate further search and/or substantive reexamination.

Applicants thank Examiners Venne and Olson for the courtesies extended to applicants' representative during a personal interview conducted on November 29, 2007. During the interview, a proposed amendment was discussed, which corresponds to the amendments made in the present response, and applicants' representative noted certain distinctions between the subject matter set forth in claims 1, 11 and 12 as amended, relative to the applied prior art. No agreement was reached with respect to the allowability of the claims in the current form presented by this response.

OBJECTION TO THE SPECIFICATION

As indicated in the Advisory Action of October 24, 2007, applicants previous response filed on October 11, 2007, which has been entered, is sufficient to remove this grounds for objection.

CLAIM OBJECTIONS

As agreed in the continuation sheet of the Advisory Action dated October 24, 2007, the revisions to the claims made in the Amendment filed on October 11, 2007, which has been entered, is sufficient to overcome the objections to the claims as set forth in the Final Rejection of July 19, 2007.

CLAIM REJECTIONS UNDER 35 U.S.C. §103

Claims 1-14 stand rejected under 35 U.S.C. §103(a) as being unpatentable over WO 0154971 A1 to Varis (hereafter "*Varis*") in view of NO 10907 (hereafter "*Parsons '907*") on the grounds set forth in paragraph 4 of the Official Action. For at least the reasons noted below, this rejection should be withdrawn.

The present invention is directed to an improved propulsion arrangement. In particular, the present invention is directed to an arrangement in a counterrotating propulsion (CRP) system. The unique nature of CRP systems presents specific engineering and design challenges. One unique problem associated with a CRP system is an additional cavitation affect produced when the aft propulsion is pivoted, such as when a thruster is turned to steer a vessel, the aft propeller operates in the wake of the forward propeller while the aft propeller is turned at an angle relative to the forward propeller (see, e.g., page 1, lines 15-19 of the present specification).

This form of cavitation is sometimes referred to as "sheet cavitation." An arrangement constructed according to the present invention minimizes the harmful effects associated with hub vortex cavitation by arranging a well-streamlined hub after the forward propeller with flow plates being disposed on the hub (see, e.g., page 4, lines 17-20). An arrangement constructed according to the principles of the present invention is set forth in amended claim 1. Amended claim 1 recites:

1. Arrangement in a counter rotating propulsion system comprising an aft propeller installed on a thruster rotatable about a vertical axis, and a forward propeller installed on a shaft or on a thruster, whereby the aft propeller and the forward propeller have opposite directions of rotation and the aft and forward propellers are arranged opposing each other, each of the propellers having a hub with a cap, the hub and cap associated with the forward and aft propellers are arranged opposing each other, wherein at least two equally distributed flow blades are arranged on the cap of the forward propeller and that the flow blades are radially projecting from the cap, the flow blades link up to each other and extend beyond an aft facing end of the cap.

According to a further aspect, an arrangement formed according to the principles of the present invention is set forth in claim 11. Claim 11 recites:

11. Arrangement in a counter rotating propulsion system, comprising an aft propeller installed on a thruster rotatable about a vertical axis, and a forward propeller installed on a shaft or on a thruster, the aft propeller and the forward propeller have opposite directions of rotation and the aft and forward propellers are arranged opposing each other, wherein each of the propellers have a hub with a cap, whereby the hub and cap associated with the forward and aft propellers are arranged opposing each other, at least two equally distributed flow blades are arranged on the cap of the forward propeller and the flow blades are radially projecting from the cap, the flow blades link up to each other and extend beyond an aft facing end of the cap.

According to still another aspect, an arrangement constructed according to the principles of the present invention is defined by claim 12:

12. *An arrangement comprising:*
a thruster rotatable about a vertical axis comprising an aft propeller, a first hub and a first cap; and
a forward propeller, and a second hub and a second cap associated with the forward propeller, the second cap having a diameter, the second cap comprising a plurality of equally spaced flow blades projecting from the second cap in a radial direction with no inclination and without extending beyond the diameter of the second cap;
wherein the aft propeller and the forward propeller have opposite directions of rotation;
wherein the first cap and the second cap are arranged opposing each other and are spaced apart; thereby defining a separation zone; and
wherein the flow blades are constructed and arranged to eliminate cavitation in the separation zone when the aft propeller is not co-axial with the forward propeller, the flow blades link up to each other and extend beyond an aft facing end of the cap.

The proposed combination of *Varis* and *Parsons '907* fail to render obvious the arrangements defined by the claims of the present application, as set forth above.

Varis is directed to a CRP propulsion system for a marine vessel. Such propulsion systems are discussed in the background of the present application. The present invention is based on an effort to improve the performance and reliability of such propulsion systems by minimizing cavitation effects unique to the operation of these relatively complex propulsion systems.

In contrast to the unique problems associated with the operation of CRP propulsion systems, *Parsons '907* is directed to a single propeller arrangement. The unique problems associated with CRP systems are not present during operation of the single propeller system described by *Parsons '907*. Thus, for example, the disclosure of *Parsons '907* is of no value to one of ordinary skill in the art seeking to minimize the effects of the aforementioned "sheet cavitation" as well as the

interaction between said sheet cavitation and other forms of cavitation which may be present in the operation of CRP systems. Thus, one of ordinary skill in the art seeking to modify the CRP system of *Varis*, such as in an attempt to minimize adverse consequences of complex cavitation effects experienced during operation of these systems, would not have viewed the teachings of *Parsons '907* as being relevant to providing modifications which would be successful in eliminating or mitigating the aforementioned complex and interacting cavitation mechanisms. In other words, it would not have been obvious to one of ordinary skill in the art to have modified CRP system of *Varis* based on the teachings of a very rudimentary single propeller system as described in *Parsons '907*. It is respectfully submitted that the rejections based upon modification rooted in hindsight, and not the objective teachings of the *Varis* and *Parsons '907* references.

Moreover, since *Parsons '907* involves a single propeller, and not a forward and aft propeller system, there is no guidance provided whatsoever with regard to the teachings of *Parsons '907* as to whether one should modify the forward or aft propeller of a CRP system such as that described by *Varis*.

For at least the reasons noted above, it would not have been obvious to have combined the *Varis* and *Parsons '907* references in the manner suggested.

In addition, as apparent from the above, claims 1, 11 and 12 each require that "... the flow blades link up to each other and extend beyond an aft facing end of the cap." As acknowledged in the grounds for rejection, *Varis* fails to disclose a hub having any such flow blades whatsoever. The fins described by *Parsons '907*, which have been asserted as constituting flow blades, clearly do not link up to each other and extend beyond an aft facing end of the cap as required by claims 1, 11 and 12.

Thus, even if the proposed combination of prior art references were appropriate, the claimed invention would not result. Neither *Varis* nor *Parsons '907* provide any guidance, suggestion or motivation to one of ordinary skill in the art to extend the flow blades beyond the aft facing end of the hub. As set forth on page 4 of the present specification, such a construction provides for a well-streamlined hub that minimizes harmful effects which can be caused by hub vortex cavitation. Thus, for at least this additional reason, the rejection should be withdrawn.

Claims 1-14 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Varis* in view of GB 9792 (hereafter "*Parsons '792*") on the grounds set forth in paragraph 5 of the Official Action. For at least the reasons noted below, this rejection should be withdrawn.

The combination of *Varis* with *Parsons '792* are traversed upon the same grounds set forth above in connection with the rejection based on *Varis* and *Parsons '907*, and all of the remarks above are incorporated herein by reference. As acknowledged in the grounds for rejection, the disclosure of *Parsons '792* and *Parsons '907* appear to be substantially the same. Thus, for the same reasons noted above, it would not have been obvious to one of ordinary skill in the art to have combined the teachings of *Varis* with *Parsons '792* in the manner suggested. In addition, *Parsons '792* provides no guidance whatsoever with regard to which propeller structure (i.e., the forward or aft propeller) of a CRP system should be modified in an effort to eliminate or mitigate the adverse consequences of cavitation.

In addition, as explained above, neither *Varis* nor *Parsons '792* disclose a construction which includes flow blades that link up to each other and extend beyond an aft facing end of the cap as required by claims 1, 11 and 12. Thus, even if the

proposed combination of prior art references were appropriate, the claimed invention would not result. Thus, the rejection should be withdrawn for at least this additional reason.

CONCLUSION

From the foregoing, further and favorable action in the form of a Notice of Allowance is earnestly solicited. Should the Examiner feel that any issues remain, it is requested that the undersigned be contacted so that any such issues may be adequately addressed and prosecution of the instant application expedited.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

Date: January 22, 2008

By:


Scott W. Cummings
Registration No. 41,567

P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620